

Clinch River Creel Survey Results

April – October 2005

TWRA Fisheries Report 06 - 08



Prepared By

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ABSTRACT

Fishing pressure on the Clinch River between April and October 2005 totaled 82,331 hours and the Clinch River remains one of the most heavily fished trout tailwaters in Tennessee. Catch and harvest rates for trout were among the highest observed for any tailwater fishery in the State. Fishing pressure and angler demographics on the Clinch River have remained relatively constant since 1996.

INTRODUCTION

Fishing pressure, catch characteristics, and angler demographics at the Clinch River below Norris Dam were previously examined in 1996 and 2001 (Bettoli and Bohm 1997; Bettoli 2002). This report presents the findings of a roving creel survey conducted during the 2005 fishing season. The Clinch River was stocked with more than half a million trout in 2005 (Habera et al. 2006), of which 33,000 were large (230 – 250 mm total length, TL) rainbow trout and 362,153 were fry or fingerling rainbow trout. Large (180-200 mm TL) brown trout were stocked in April 2005 (n = 33,431) and brown trout fry (n = 75,260) were stocked in March 2005. Any of the nearly 370,000 fry and fingerling trout and 68,000 larger trout stocked into the Clinch River in 2004 that survived would have also contributed to the fishery in 2005.

METHODS

A stratified uniform-probability roving creel survey was conducted between April 1st and October 31st 2005. The 2005 survey followed the same general methods used in previous surveys, with the following change: the Culp Property access point, located at the head of Llewellyn Island on the right bank (descending), was no longer accessible to the clerk in 2005. The number of anglers counted and the number of anglers interviewed at that access point were

less than 5% in the 2001 survey; therefore, the loss of that access was not considered to be problematic. Approximately eight weekdays and eight weekend days were surveyed each month. Sampling days were divided into three equal work periods based on sunrise and sunset times.

The first, second, and third work shifts were sampled with equal probability. The clerk was equipped with binoculars and counted anglers once each work shift by visiting all of the access sites. The time to start the count was randomly selected from a list of possible start times for each shift, beginning at the start of each shift and every 30 minutes thereafter until 1 h before the end of each shift. If the count of boat trailers at ramps exceeded the count of boats on the river, the angler counts were adjusted upwards by adding two anglers for each boat that was presumed to be on the river, but was not observed.

Before and after the count, the clerk interviewed anglers. They were asked how long they had been fishing that day, whether they were finished fishing, and how many trout of each species they had caught (and harvested). All creel trout were measured to the nearest inch. Anglers were asked their state of residency and Tennessee residents were asked for their county residence. The clerk also recorded the method of fishing used by each angler.

Mean daily counts were expanded to estimate effort in each stratum (i.e., kind-of-day), and then pooled to estimate effort each month following the methods of Pollock et al. (1994). Catch and harvest rates were measured using the mean of ratios method, which is recommended for roving creel surveys (Pollock et al. 1997). Interviews of parties that had been fishing for less than 30 minutes were excluded from the analysis. Catch rates for complete and incomplete-trip anglers differed (Wilcoxon two-sample test; $P = 0.001$), as did harvest rates ($P = 0.001$). Therefore, catch and harvest data for incomplete trips were ignored when calculating daily estimates of catch and harvest *unless* there was only one complete-trip interview on a given day. In those instances, interviews of all parties were used to generate mean catch and harvest rates. Standard errors of catch, harvest, and effort each month were calculated according to Pollock et al. (1994). An Excel spreadsheet performed all necessary calculations. The pooled variance for total pressure, total harvest, and total catch of each species was calculated using the mean-square-

successive-difference-between-periods procedure. The standard error of each estimate was calculated by taking the square root of the variance.

RESULTS and DISCUSSION

The clerk interviewed 1,855 anglers in 1,179 parties in the 2005 survey; 749 anglers had finished fishing when interviewed (i.e., complete-trip anglers). Fishing pressure over comparable survey periods has remained essentially constant for the past decade. Fishing pressure in 1996, 2001, and 2005 between April and October each year totaled 80,589 hours, 79,405 hours, and 82,331 hours, respectively. Mean trip length (completed trips only) in 2005 averaged 3.42 hours ($n = 464$; $SE = 0.07$); thus, an estimated 24,073 trips were made to the tailwater in 2005, which was intermediate to the number of trips over comparable seven-month periods in 1996 and 2001 (26,165 and 22,242 trips, respectively). Compared to other Tennessee tailwaters surveyed in the past decade, the Clinch River is one of the most heavily fished trout rivers in the State (Table 1).

The total amount of water discharged through Norris Dam during the fishing season (i.e., March – October) was slightly below the 13-year average (Figure 1). Discharges in earlier creel surveys were much lower (2001) and slightly higher (1996) than average. Given that fishing pressure has remained virtually constant over all three survey years, it is reasonable to conclude that there is no tight linkage between fishing pressure and discharge regimes in the Clinch River. This is not surprising because the Clinch River is amenable to float fishing using small boats, rafts, canoes, and powerboats during periods of generation, unlike tailwaters such as the Elk and Caney Fork rivers. Thus, some anglers can fish the Clinch River at all but the highest levels of generation, albeit different types of anglers compared to periods of no generation (i.e., boat anglers versus bank and wading anglers).

Anglers experienced outstanding catch rates in 2005. The average catch rate (number of trout of both species caught per hour by complete-trip anglers) was 2.21 ($SE = 0.06$) trout- h^{-1} , compared to only 0.71 (0.08) trout- h^{-1} in 2001 and 1.42 (0.10) trout- h^{-1} in 1996. All of those catch rates were statistically different from each other (ANOVA; d.f. = 2, 941; $F = 71.8$; $P < 0.001$).

The high catch rates in 2005 translated into high estimates for the number of trout caught in 2005. Anglers caught more than 130,000 rainbow trout and more than 40,000 brown trout over the seven-month survey (Table 2). Over comparable seven-month periods, the catches for those two species were 34,844 rainbow and 8,125 brown trout in 2001 and 91,810 rainbow and 2,114 brown trout in 1996.

On a per-trip basis, most (63%) anglers in 2005 did not harvest a trout (Figure 2), compared to 79% of anglers in 2001 and 63% in 1996. Complete-trip anglers reported harvesting an average of 1.21 trout per angler per trip, which was above average compared to other rivers in other years (Table 3). The percentage of anglers catching at least one trout jumped to 93% in 2005, compared to 58% in 2001 and 75% in 1996-1997. Those same anglers reported catching 7.22 trout per trip, which was one of the highest catch rates ever observed for any Tennessee tailwater (Table 4).

The clerk observed 797 rainbow trout in the creel in 2005 and 43% were 300 mm (12 inches) TL or longer (Figure 3). In contrast, only 17% of the rainbow trout measured in 2001 were longer than 300 mm TL. The largest rainbow trout observed in the creel in 2005 was 560 mm TL (22 inches), which was the same size as the largest rainbow trout observed in 2001. Unlike in 2001, the clerk regularly encountered brown trout in 2005. One hundred and thirty-three brown trout were measured in 2005 and 23% were longer than 300 mm TL; the largest brown trout creeled in 2005 was 520 mm TL (20 inches).

In general, anglers who fished the Clinch River during the 2005 survey shared the same characteristics as those who fished it during the 1996 and 2001 surveys. Nearly all (98%) of the anglers interviewed in 2005 were Tennessee residents; that percentage was 95% in both previous surveys. The percentages of interviewed anglers using flyfishing gear remained unchanged between the three surveys (16 – 17%). Most of the anglers interviewed in 2005 were using some form of bait (66%) as opposed to artificial lures or flies; slightly higher percentages (71-73%) of anglers used bait in the two previous surveys. As in the previous surveys, most Tennessee residents fishing the Clinch River in 2005 lived in Knox and Anderson counties. Although the percentage of resident anglers hailing from Anderson county in 2005 (30%) has remained

relatively unchanged since 1996 (26-31%), the percentage of Tennessee anglers residing in Knox County has fallen steadily from 50% in 1996-1997 to 46% in 2001 and 36% in 2005. Campbell and Blount county anglers represented 10% and 12%, respectively, of all Tennessee anglers interviewed on the Clinch River in 2005.

CONCLUSIONS

Fishing pressure in 2005 was statistically similar to the amount of pressure the river received in 1996 and 2001. Angler characteristics since 1996 varied even less than fishing pressure. The Clinch River remains a local fishery (i.e., few out-of-state anglers; most Tennessee anglers reside in adjoining counties) and the percentage of interviewed anglers who were fly-fishing has remained constant at about 17%. The only noteworthy angler trend detected in 2005 was a declining percentage of anglers from Knox county, and a corresponding increase in the percentage of anglers living in Blount County, which lies just south of Knox County.

By all accounts, trout fishing on the Clinch River was excellent in 2005. The catch rate (fish per hour) was very high and the numbers of fish caught and harvested per trip were among the highest observed in any Tennessee tailwater. These observations of good fishing are also noteworthy given that electrofishing sampling in February 2005 (before the creel survey began) yielded low catches of most sizes of trout compared to catches in the preceding six years (Habera et al. 2006). Large numbers of fingerling and catchable trout of both species were stocked after the winter electrofishing survey (and before the creel survey began) and river conditions were good during the fishing season; these two factors probably were responsible for the high catch rates anglers experienced during the 2005 survey.

ACKNOWLEDGMENTS

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Table 1. Fishing pressure over comparable 26-week (6-month) periods at six Tennessee tailwaters managed for trout fishing.

River	Start of 26-week Survey	Pressure (hours)	Reference
Hiwassee	4/01/04	39,459	Bettoli (2005)
S.F. Holston	4/01/02	39,594	Bettoli (2003a)
Watauga	3/28/98	53,444	Bettoli (1999)
Hiwassee	3/27/99	59,380	Luisi and Bettoli (2001)
Caney Fork	4/01/03	60,991	Bettoli (2004)
Caney Fork	3/29/97	61,853	Devlin and Bettoli (1999)
Caney Fork	4/04/95	74,534	Bettoli and Xenakis (1996)
Clinch	4/01/01	75,507	Bettoli (2002)
Clinch	3/30/96	75,876	Bettoli and Bohm (1997)
Clinch	4/01/05	77,277	This Study ←
S.F. Holston	4/01/97	84,119	Bettoli et al. (1999)
Watauga	4/01/02	87,787	Bettoli (2003b)

Table 2. Fishing pressure and number of trout caught and harvested at the Clinch River, 2005.

Month	Pressure		Number of Rainbow Trout				Number of Brown Trout			
	(h)	SE	Caught	SE	Harvested	SE	Caught	SE	Harvested	SE
April	12,647	2,137	18,795	5,477	4,733	1,097	3,760	1,236	108	69
May	14,307	2,016	23,631	4,486	3,531	933	12,780	2,823	1,692	1,351
June	13,593	1,634	20,667	4,745	2,878	745	5,929	1648	305	133
July	15,870	2,026	23,768	4,201	3,791	922	11,334	2751	1,079	285
August	11,134	1,052	18,361	3,573	3,797	828	2,597	955	420	280
September	9,726	1,226	18,973	4,065	5,280	1,356	2,595	739	543	298
October	5,054	636	6,008	1,533	864	299	1,414	790	140	140
Total	82,331	5,590	130,203	11,698	24,874	3,734	40,409	11,594	4,287	1,796

Table 3. Mean number of trout harvested per angler by river and year, based on complete-trip interviews.

River	Year	Harvest per angler per trip
Watauga	2002	0.23
Clinch	2001	0.61
Watauga	1998	0.80
S.F. Holston	2002	0.81
Caney Fork	2003	1.00
Hiwassee	1999	1.15
Caney Fork	1997	1.18
Hiwassee	2004	1.20
Clinch	2005	1.21 ←
Clinch	1996	1.31
S.F. Holston	1997	1.31
Caney Fork	1995	1.70

Table 4. Mean number of trout caught per angler by river and year, based on complete-trip interviews.

River	Year	Catch per angler per trip
Clinch	2001	2.38
Caney Fork	2003	3.20
Caney Fork	1997	3.29
Clinch	1996	4.02
Hiwassee	1999	4.33
Watauga	1998	4.60
S.F. Holston	1997	4.65
Hiwassee	2004	4.96
Caney Fork	1995	5.20
S.F. Holston	2002	5.88
Clinch	2005	7.22 ←
Watauga	2002	10.1

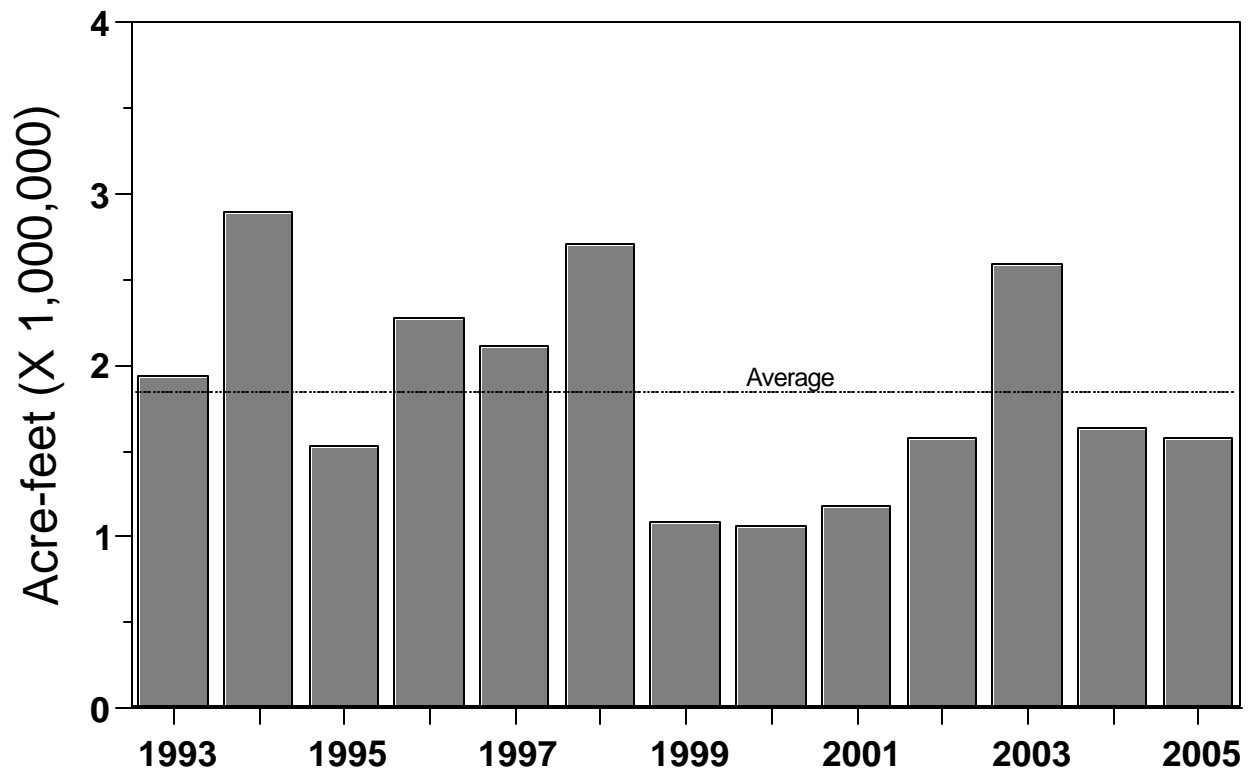


Figure 1. Total amount of water discharged through Norris Dam between March 1st and October 31st, 1993-2005.

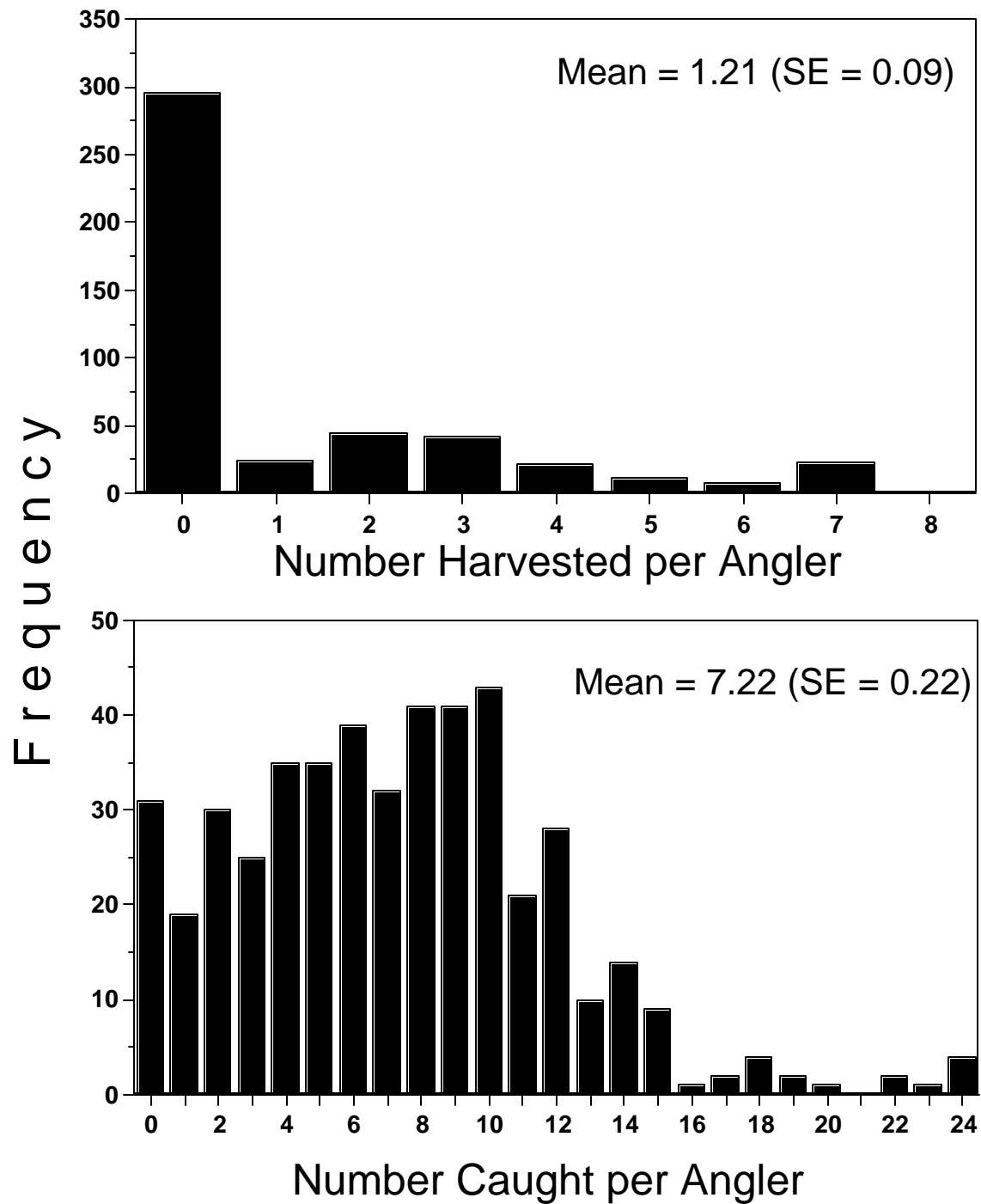


Figure 2. Frequency distribution for the average number of trout harvested and caught by each member of parties that had completed fishing when interviewed on the Clinch River, April - October 2005. N = 470 parties

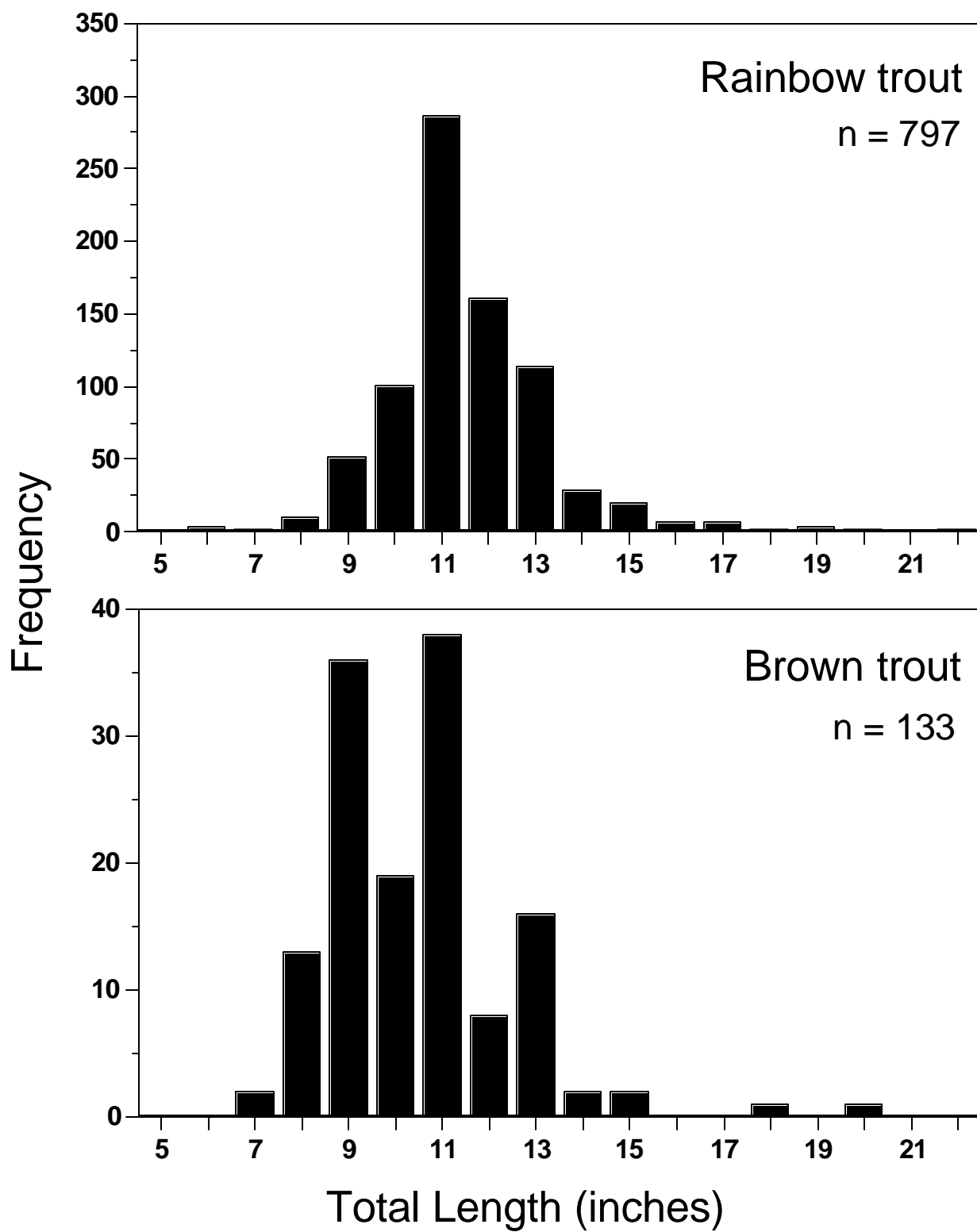


Figure 3. Length-frequency distributions for trout harvested from the Clinch River, Tennessee, April - October 2005.

Appendix

Data forms used in the 2005 Clinch River Creel Survey

DAILY SAMPLE SHEET – CLINCH 2005

DATE (month/day) _____

KIND OF DAY _____

01 = weekday 02= weekend

TIME COUNT BEGAN _____
(military time)

RIVER STAGE WHEN (and WHERE)

COUNT BEGAN _____

01 = no generation 02 = partial generation 03 = full generation

Access Point	Number of Anglers	Number of Boats	Number of Cars	Number of Trailers
1. SONGBIRD				
2. WEIR DAM				
3. MILLER ISLAND				
4. MASSENGILL BRIDGE				
5. PEACH ORCHARD				
6. HWY 61 RAMP				
7. COUNTY JAIL				

TOTALS

ANGLERS

BOATS

CARS

TRAILERS

End Mileage = _____

Beginning Mileage = _____

Total Mileage = _____

DATE (month/day) _____

KIND-OF-DAY _____
Weekday = 1 Weekend / holiday = 2

ACCESS POINT (1 - 8) _____

START OF FISHING _____
(MILITARY TIME)

Time Fishing HRS
By Party

 MIN

INTERVIEW NUMBER _____

NUMBER IN PARTY _____

END OF FISHING _____
(MILITARY TIME)

COMPLETED TRIP? _____
YES = 1 NO = 2

STATE AND COUNTY (IF TN) OF RESIDENCE

START & END OF SHIFTS ON THE CLINCH RIVER – 2005

Month	Days	Daylight Hours	Sunrise	1/3 rd	2/3 rd	Sunset	~ Shift Length
March	1 - 15	11.67	6:57	10:50	2:43	6:37	3:53
	16 - 31	12.22	6:36	10:40	2:44	6:49	4:04
April	1 - 2	12.60	6:21	10:33	2:45	6:58	4:12
	<i>(DST starts April 2)</i>						
	3 - 15	12.92	7:10	11:28	3:46	8:06	4:18
	16 - 30	13.38	6:53	11:21	3:49	8:17	4:28
May	1 - 15	13.87	6:36	11:14	3:51	8:28	4:37
	16 - 31	14.28	6:24	11:10	3:56	8:42	4:46
June	1 - 15	14.53	6:19	11:10	4:01	8:52	4:51
	16 - 30	14.60	6:20	11:12	4:04	8:56	4:52
July	1 - 15	14.50	6:26	11:16	4:06	8:56	4:50
	16-31	14.22	6:36	11:20	4:04	8:49	4:44
August	1 - 15	13.78	6:48	11:24	4:00	8:35	4:36
	16 - 31	13.28	7:00	11:26	3:52	8:18	4:26
September	1 - 15	12.70	7:13	11:27	3:41	7:55	4:14
	16 - 30	12.17	7:24	11:27	3:30	7:33	4:03
October	1 - 15	11.58	7:36	11:28	3:20	7:12	3:52
	16 - 29	11.02	7:50	11:30	3:10	6:50	3:40
	<i>(DST ends October 30)</i>						
	30 - 31	10.78	6:56	10:32	2:08	5:44	3:36

First Shift: Sunrise → first third of day
 Second Shift: Middle third of the day
 Third Shift: Last third of day (end at sunset)